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Water Quality Survey of the Potomac Estuary

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FEDERAL WATER POLLUTION
CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION

PENNSYLVANIA
MARYLAND
DISTRICT OF COLUMBIA
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA

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Chesapeake Technical Support Laboratory
Middle Atlantic Region
Federal Water Pollution Control Administration
U.S. Department of the Interior

1967 Data Report

WATER QUALITY SURVEY

OF THE

POTOMAC ESTUARY

by

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I INTRODUCTION

A. Purpose and Scope

During the year of 1967, the Chesapeake Technical Support Laboratory, Middle Atlantic Region, Federal Water Pollution Control Administration conducted three separate surveys on the estuary portion of the Potomac River. These surveys were conducted to determine existing water quality. The results of these investigations are presented in this report.

B. General Remarks

An intensive bacteriological and total phosphorus water quality survey was conducted on the estuary during the weeks of March 2 thru 14. A two-day intensive nutrient water quality study was conducted September 20-21. During the weeks of February 3 thru 21 an intensive bacteriological survey was conducted of four sewage treatment plants discharging in the Potomac estuary.

C. Sampling Procedures

Surface samples for chemical analysis were obtained by dipping a plastic bucket or large funnel into the river water with a minimum of agitation. Samples were retained in plastic one-gallon "cubitainers." Dissolved oxygen (DO) samples were obtained by siphoning from the bucket or by attaching a tube to

the funnel outlet and extending it to the bottom of a conventional 300 ml DO bottle. The bottle was overfilled twice without excessive agitation, and the DO fixed immediately. Temperature was measured in the dipped bucket immediately after sampling.

Bottom samples were taken using a plastic Van Dorn sampler. Sampling procedures were otherwise identical to those used for surface samples. All samples were stored on ice. Analysis was started immediately on return to the Chesapeake Technical Support Laboratory, generally within two hours of sampling.

All bacteriological samples were obtained by dipping a sterile sample bottle directly into the stream. The full bacteriological sample bottle was then capped and iced. Analysis was started immediately on return to an on the spot mobile laboratory.

D. Measured Parameters and Analytical Methods

1. Water temperature was determined using a mercury thermometer inserted into the sample container immediately upon collection.

2. Light extinction, in inches, was made with a 12" (30 cm) white Secchi disk.

3. Dissolved Oxygen

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Dissolved Oxygen was determined by the azide modification of the basic Winkler method with the titration done potentiometrically with an automatic "titralyzer."

4. Total Phosphorus

Reference: Menzel, D.W. and Corwin, N. 1965.

The Measurement of Total Phosphorus in Seawater Based on the Liberation of Organically Bound Fractions by Persulfate Oxidation. *Limnology and Oceanography*, 10: 280-282.

Murphy, J. and Riley, J.P. 1962. A Modified Single Solution Method for the Determination of Phosphate in Natural Waters. *Analytica Chimica Acta*, 27: 31-36.

Total Phosphate was determined after persulfate oxidation of the sample in an autoclave at 15 psi for 30 minutes. The resultant ortho-phosphate was then determined colorimetrically as the molybdenum-blue complex with the optical density measured at 882 m μ .

5. Inorganic Phosphorus

Reference: Murphy, J. and Riley, J.P. 1962.

A Modified Single Solution Method for the Determination of Phosphate in Natural Waters. *Analytica Chimica Acta*, 27: 31-36.

Inorganic Phosphorus was determined colorimetrically as the molybdenum-blue complex with the optical density measured at 882 m μ .

6. Total Kjeldahl Nitrogen

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Total Kjeldahl Nitrogen includes ammonia and organic nitrogen and was determined by the standard micro-kjeldahl procedure. The sample was digested in the presence of strong acid to convert the organic nitrogen to ammonia. The ammonia was then distilled, collected in boric acid solution, nesslerized and determined colorimetrically.

7. Nitrate + Nitrite

Reference: A Manual of Sea Water Analysis, J.D.H. Strickland and T.R. Parsons, 2nd. ed., Queen's Printer and Controller of Stationery, Ottawa, Canada, 1965.

Nitrate plus Nitrite nitrogen was determined by the cadmium reduction of nitrate to nitrite and subsequent diazotization with sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride. The results were calculated as nitrite nitrogen.

8. Chlorides

Reference: Fisher Scientific Company, Bulletin #64-4A.

The Chloride concentration was determined by titrating the sample with standard silver nitrate to a

potentiometric end point using a silver indicating electrode and a silver/silver chloride reference electrode.

9. Chlorophyll

Reference: A Manual of Sea Water Analysis, J.D.H. Strickland and T.R. Parsons, 2nd. ed., Queen's Printer and Controller of Stationary, Ottawa, Canada, 1965.

Chlorophyll a was determined by extraction of millipore-filtered samples in 90% acetone and read spectrophotometrically.

10. Turbidity

Turbidity was determined with a Hach photoelectric nephelometer, calibrated in Jackson Turbidity Units.

11. Coliform

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Coliform population was determined using the 5 tube-3 dilution Multiple-Tube Fermentation Technique. Lauryl sulfate tryptose broth was used for the presumptive test with incubation at $35^{\circ} \pm 0.5^{\circ}\text{C}$. Brilliant green lactose bile broth was used for the confirmatory test with incubation at $35^{\circ} \pm 0.5^{\circ}\text{C}$. The results were reported as the Most Probable Number (MPN).

12. Fecal Coliform

Reference: Standard Methods for the Examination of

Water and Wastewater, 12 ed., 1965.

Water Pollution Control Research Series, WP-20-3.

Fecal Coliform population was determined using the 5 tube-3 dilution Multiple-Tube Fermentation Technique.

Lauryl sulfate tryptose broth was used for the presumptive test with incubation at $35^{\circ} \pm 0.5^{\circ}\text{C}$. EC medium was used for the confirmatory test with air incubation at $45.5^{\circ} \pm 0.5^{\circ}\text{C}$. The results were reported as the Most Probable Number (MPN).

13. Fecal Streptococcal

Reference: Standard Methods for the Examination of Water and Wastewater, 12 ed., 1965.

Fecal Streptococcal population was determined using the 5 tube-3 dilution Multiple-Tube Fermentation Technique. Azide dextrose broth was used for the presumptive test with incubation at $35^{\circ} \pm 0.5^{\circ}\text{C}$. Ethyl violet azide broth was used for the confirmatory test with incubation at $35^{\circ} \pm 0.5^{\circ}\text{C}$. The results were reported as the Most Probable Number (MPN).

II STATION LOCATIONS

Cabin John Bridge

Chain Bridge

Key Bridge

M Street Bridge - Rock Creek

Memorial Bridge

14th Street Bridge

Haines Point

Pennsylvania Avenue Bridge - Anacostia River

Bolling Air Force Base - Can Buoy 9

Bellevue

Woodrow Wilson Bridge

Broad Creek

Piscataway Creek

Dogue Creek

Hallowing Point

Indian Head

Possum Point

Sandy Point

Smith Point

Maryland Point

Nanjemoy Creek

Route 301 Potomac River Bridge

Alexandria Sewage Treatment Plant

Arlington Sewage Treatment Plant

Blue Plains Sewage Treatment Plant

Fairfax Westgate Sewage Treatment Plant

III SURVEY RESULTS

1967 CHESAPEAKE TECHNICAL SUPPORT LABORATORY POTOMAC ESTUARY SURVEY

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
67013126	1-31	1545	4		13,000	1,100	110									
020613	2-06				2,400	490	< 20									
1407	2-14	1030			50	20	< 20									
2007	2-20	1045			790	230	20									
67013127	1-31	1450	4		9,180	1,300	80									
020612	2-06				790	130	< 20									
1408	2-14	1100			130	< 20	< 20									
1525	2-15	1130	4.5		330	170	20									
1608	2-16	1040	5.5		230	230	20									
2313	2-23	1100			790	170	70									
030201	3-01	1230	2													
25	3-02	0945			80	50	< 20									.153
0309	3-03	1015	5		90	20	< 20									.155
14	3-03	1015	3													
0630	3-04	0930	5													.132
01	3-04				310	230	< 20									
25	3-05	1200			330	50	< 20									.225
48	3-05															
59	3-06	0930	4													
75	3-06	0930	5		3,480	790	110									.177
0709	3-07	0920			9,180	790	1,100									1.316
21	3-08	0920	5													1.701
0805	3-08	0940	4.8		6,300	2,400	2,780									.936
21	3-08	0940	4.8		3,480	130	LA									.717
0901	3-09	0930	5		LA	1,090	LA									.578
12	3-09	0930	5													.355
1003	3-10	1220	7													.264
19	3-10	1220	7													
1301	3-11				LA											
17	3-12	0915	7		LA	LA	LA									
54	3-11	0930	7		LA	LA	LA									
70	3-12	0915	7													
1410	3-13	1000	8		1,200	80	200									
26	3-13	1000														

LA Laboratory Accident

Sample Number	Date Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
Key Bridge- Station 1																
67012409	1-24	0810			200	< 200	< 200									
3001	1-30	1555	4		16,090	3,480	490									
021526	2-15	1155	4.5		1,300	490	20									
1607	2-16	1025	5		2,400	1,300	50									
092001	9-20	1030	21.3	40				.133	.008	.558	.370		30.75	3	11.3	7.69
2101	9-21	1045	22	38				.135	.002	.420	.110		36.00		11.0	8.14
			21													5.29
M Street Bridge - Rock Creek																
67022314	2-23	1125			50	50	20									
030202	3-01	1315						.343								
21	3-02	1030	0					.219								
26	3-01	1030			17,000	3,300	< 200									
0310	3-03	1045	3					.468								
15	3-02	1045	3		1,609,000	33,000	900									
0603	3-03				141,000	14,000	2,000									
27	3-04				55,000	5,000	4,000									
31	3-04	1000	6					.356								
47	3-05	1130	5					.158								
60	3-05	0950	6		330,000	26,000	7,000									
76	3-06	0950	6		100,000	13,000	70,000									
0710	3-06	0945	5.5					.193								
22	3-07	0945	5.5		23,000	23,000	2,000									
0806	3-07	1020	3.5					1.340								
22	3-08	1020	4		13,000	5,000	< 2,000									
0902	3-08	1000	4					.495								
13	3-09	1000	4					.384								
1004	3-09	1150	6		LA	49,000	LA									
20	3-10	1150	6		LA	LA	LA									
1302	3-10				LA	LA	LA									
18	3-11	0945	8					.508								
55	3-11	0945	7													
71	3-12	0945	8					.349								
1411	3-12	1020	6.5					.340								
27	3-13	1020	6.5		11,000	< 2,000	23,000									
								.280								
Memorial Bridge - Station 2B																
67022315	2-23	1150			12,000	9,000	7,900									
030203	3-01	1345						.177								
27	3-01	1100	0		200	< 200	< 200									
22	3-02	1100	0					.207								
0311	3-03	1100	2					.137								
16	3-02	1100	2		500	200	< 200									
0602	3-03				< 200	< 200	< 200									
26	3-04				800	< 200	< 200									

LA Laboratory accident

Sample Number	Date Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P mg/l	Inorg. P PO ₄ mg/l	TKN mg/l	NO ₂ -NO ₃ mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
Memorial Bridge - Station 2B continued															
67030632	3-04	1030	4					.231							
67030632	3-05	1115	4					.180							
67030632	3-05	1015	5												
67030632	3-06	1015	5					.224							
67030632	3-06	1600	4												
67030632	3-07	1000	4					.706							
67030632	3-07	1040	4												
67030632	3-08	1040	4					1.774							
67030632	3-08	1015	5												
67030632	3-09	1015	5					.899							
67030632	3-09	1120	6												
67030632	3-10	1120	6					.948							
67030632	3-11	1000	8												
67030632	3-11	1015	7												
67030632	3-12	1000	8					.534							
67030632	3-12	1045	8					.244							
67030632	3-13	1045	8					.479							
11th Street Bridge - Station 2															
67012410	1-24	0820													
67012410	1-30	1530	3.5												
67012410	2-15	1050													
67012410	2-16	1005													
67012410	9-20	1038	24	26				.387	.022	.853	.316	35.25	3	10.8	7.79
67012410	9-21	1055	21	22				.173	.024	.602	.166	42.75		10.7	6.87
Haines Point - Station 3															
67012411	1-24	0830													
67012411	1-30	1515	4												
67012411	9-20	1045	24	26				2.172	1.892	2.573	.720	24.00	4	14.4	2.29
67012411	9-21	1103	21.5	20				2.000	2.195	2.761	.304	27.75		14.3	2.46
Pennsylvania Avenue Bridge - Anacostia River															
67022317	2-23	1400													
67022317	3-01	1615						.630							
67022317	3-02	1330						1.005							
67022317	3-02	1330	3												
67022317	3-03	1230						.287							
67022317	3-03	1230	5												
67022317	3-03	1230													
67022317	3-04	1145													
67022317	3-04	1145						.434							

LA Laboratory accident

Sample Number	Date	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P mg/l	Inorg. P PO ₄ mg/l	TKN mg/l N	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a mg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
67030604	3-05	0945														

Pennsylvania Avenue Bridge - Anacostia River continued

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63	3-05	1200	8		> 160,900	54,200	17,200	.542								
79	3-06	1200														
0713	3-06	1130	4.5		221,000	70,000	9,000	.921								
25	3-07	1130														
0809	3-07	1320	6		160,900	54,200	4,600	.631								
25	3-08	1320														
0905	3-08	1215	6		34,800	24,000	LA	.644								
16	3-09	1215														
1007	3-09	1045	7		LA	2,200	LA	1.155								
23	3-10	1045														
1305	3-10	1130	9		LA	LA	LA									
21	3-11	1200														
58	3-11	1200														
74	3-12	1130						.507								
1414	3-12	1240	9.5		24,000	1,100	500	.687								
30	3-13	1240						.062								

Bollinger Air Force Base - Can Buoy 9

67030319	3-02	1010	2		800	500	< 200	.085								
29	3-03	1010														
0606	3-03	1015	2		800	< 200	< 200									
15	3-04	1005	4		800	800	< 200									
35	3-04	1015						.124								
49	3-05	1005						.944								
64	3-05	1010	4.5		700	130	80									
80	3-06	1010						.154								
0716	3-06	1025	4.5		5,420	790	1,090	.457								
28	3-07	1025														
0810	3-07	0945	3.5		34,800	4,600	1,200	1.252								
26	3-08	0945														
0906	3-08	1020	5		10,900	3,480	LA	1.373								
17	3-09	1020														
1008	3-09	0945	5.5		LA	1,720	LA	.535								
24	3-10	0945														
1306	3-10															
22	3-11															
59	3-11	0925														
75	3-12	0935						.461								
1415	3-12							.185								
					3,450	240	460									

LA Laboratory accident

Sample Number	Date Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Streptococcus MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
Bellevue - Station 4																
67012412	1-24	0840			70,000	31,000	200									
3004	1-30	1500	4		24,000	4,900	4,900									
3119	1-31	1325	5		240,000	79,000	2,300									
092004	9-20	1054	25	32				2.656	2.428	3.137	.291	19.50		2	13.2	.81
2104	9-21	1110	22.2	34				2.957	3.255	3.263	.376	32.25			14.2	.76
Woodrow Wilson Bridge - Station 5																
67012413	1-24	0850			34,800	17,200	500									
3005	1-30	1445	4.5		91,800	34,800	2,600									
3120	1-31	1305	5		24,000	13,000	800									
021528	2-15	1035			1,609,000	221,000	10,900									
1605	2-16	0940			210,000	141,000	4,900									
2316	2-23	1300			31,000	11,000	800									
030204	3-01	1515	2					LA								
23	3-02	1215	2		175,000	94,000	10,900	.669								
28	3-01	1215	2					LA								
0312	3-03	1145	3													
17	3-02	1145	3		1,609,000	1,609,000	2,300									
0605	3-03				320,000	240,000	8,000									
29	3-04				141,000	79,000	4,000									
33	3-04	1100	3					1.231								
45	3-05	1030	3					.790								
62	3-05	1050	5		260,000	34,000	5,000									
78	3-06	1050	5					.443								
0712	3-06	1035	4.5		58,000	11,000	<2,000	.215								
24	3-07	1035	4.5		13,000	<2,000	8,000									
0808	3-07	1130	5					.681								
24	3-08	1130	6		7,000	2,000	LA	.863								
0904	3-08	1130	6													
15	3-09	1130	6					.656								
1006	3-09	1000	6		LA	2,300	LA									
1304	3-10	1000	6		LA	LA	LA									
20	3-11	1045	8		LA	LA	LA	.338								
57	3-11	1100	7					.275								
73	3-12	1045	8													
1413	3-12	1130	8.5													
29	3-13	1130	8.5													
092005	9-20	1100	24	34				3.738	2.280	3.300	.586	41.25		3	13.2	1.85
2105	9-21	1125	21.9	24	8,200	1,100	.500	2.452	2.632	2.579	1.191	60.00			14.2	1.66
			21.9					2.344							13	1.62

LA Laboratory accident

Sample Number	Date Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P PO ₄	Inorg. P PO ₄	TKN mg/l N	NO ₂ -NO ₃ mg/l N	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
			Top	Bottom											Top Bottom

Broad Creek - Station 6

67012114	1-24	0905			13,000	4,900	700								
3121	1-31	1250	5		45,000	14,000	800								
030320	3-03	1100	3		542,000	172,000	3,300								
30	3-03	1100	3					1.223							
0607	3-04	1040	3		542,000	31,000	7,900								
16	3-05	1030	4		91,800	91,800	2,400								
36	3-04	1040	3					1.413							
50	3-05	1030	4					1.328							
65	3-06	1045	4.5		240,000	91,800	54,200								
81	3-06	1045	4.5					1.783							
0717	3-07	1110	4.5		34,800	13,000	4,900								
29	3-07	1110	4.5					.658							
0811	3-08	1020	4		54,200	24,000	4,900								
27	3-08	1020	4					.863							
1009	3-10	1010	5.5		LA	4,900	LA	.766							
25	3-10	1010	5.5												
1307	3-11				LA	LA	LA								
23	3-12				LA	LA	LA								
60	3-11	0950	7.5					.639							
76	3-12	1015	7					.531							
1416	3-13														
092006	9-20	1110	24	23	34,800	7,900	3,300	1.548	1.394	2.372	1.491	67.50	6	14.6	4.91
2106	9-21	1135	21.8	21.5				1.645	1.726	1.675	1.899	92.25		12.6	2.64

Piscataway Creek - Station 7

67012115	1-24	0920			3,300	2,300	< 200								
3122	1-31	1225	5		24,000	3,300	500								
030321	3-03	1120	3		160,900	34,800	800								
31	3-03	1120	3					1.433							
0608	3-04	1100	3.5		160,900	54,200	4,900								
17	3-05	1045	3.5		160,900	54,200	1,700								
37	3-04	1100	3.5					1.398							
51	3-05	1045	3.5					2.142							
66	3-06	1105	4.5		240,000	13,000	700								
82	3-06	1105	4.5					1.687							
0718	3-07	1135	5		34,800	2,300	3,300								
30	3-07	1135	4.5					1.017							
0812	3-08	1050	4.5		34,800	4,900	4,900								
28	3-08	1050	4.5					.790							
1010	3-10	1030	5.5		LA	10,900	LA								
26	3-10	1030	5.5					.583							

LA Laboratory accident

Sample Number	Date	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Inorg. P PO ₄ mg/l	TKN mg/l N	NO ₂ -NO ₃ mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
Piscataway Creek - Station 7 continued														
67031308	3-11				LA	LA	LA							
24	3-12				LA	LA	LA							
61	3-11	1010	7.5					.386						
77	3-12	1030	7					.736						
1417	3-13				63,000	2,500	1,400							
1515	3-14	1035	9					.568						
092007	9-20	1120	24	26				1.303	1.807	1.546	94.50	7	15	4.89
2107	9-21	1145	21.6	22				1.173	.772	1.755	84.00		11.2	2.57
			21.8											3.00
Dogue Creek - Station 8														
67012416	1-24	0935			3,300	800 < 200								
3123	1-31	1145	5		13,000	1,300	200							
030322	3-03	1140	3		160,900	54,200	4,900							
32	3-03	1140	3					1.362						
0609	3-04	1110	3		160,900	7,000	500							
18	3-05	1100	3.5		54,200	24,000	800							
38	3-04	1110	3					1.250						
52	3-05	1100	3.2		160,900	4,900	500	1.257						
67	3-06	1120	4.5					1.580						
83	3-06	1120	4.5		24,000	3,300	2,300							
0719	3-07	1205	5					4.835						
31	3-07	1205	5		91,800	1,700	4,900							
0813	3-08	1110	3.8					.741						
29	3-08	1110	3.8					.644						
1011	3-10	1050	7		LA	7,000	LA							
27	3-10	1050	7.1											
1309	3-11				LA	LA	LA							
25	3-12				LA	LA	LA							
62	3-11	1030	7					.627						
78	3-12	1050	7					.434						
1418	3-13				63,000	11,000	900							
1516	3-14	1055	9					.418						
092008	9-20	1130	23	24				.808	.991	1.489	81.75	8	12.8	5.21
2108	9-21	1155	21.5	24				.610	.590	1.320	84.00		11.6	6.12
			21.5											4.65
Hallowell Point - Station 9														
67012417	1-24	0950			1,300	500 < 200								
3124	1-31	1124	5		1,300	110 < 20								
030323	3-03	1205	3		3,480	700 < 20								
33	3-03	1205	3					1.031						

LA Laboratory accident

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C		Secchi Disk Inches	Coliform MPN		Fecal Coliform MPN		Fecal Strept MPN		Total P mg/l		Inorg. P mg/l		TKN mg/l		NO ₂ -NO ₃ mg/l		Chlorophyll a mg/l		Turbidity JTU		Chlorides mg/l		DO	
			Top	Bottom		MPN	MPN	MPN	MPN	MPN	MPN	PO ₄	PO ₄	PO ₄	PO ₄	mg/l N	mg/l N	NO ₃ -N	NO ₃ -N	mg/l	mg/l			mg/l	mg/l	Top	Bottom

Hallowing Point - Station 9 continued

67030610	3-04	1130	3			16,090																					
19	3-05	1115	2.5			> 16,090																					
39	3-04	1130	3																								
53	3-05	1115	2.5																								
68	3-06	1135	4.5			2,400																					
84	3-06	1135	4.5																								
0720	3-07	1235	5			10,900																					
32	3-07	1235	5																								
0814	3-08	1125	4.5			34,800																					
30	3-08	1125	4.5																								
1012	3-10	1115	7			LA																					
28	3-10	1115	7																								
1310	3-11					LA																					
26	3-12					LA																					
63	3-11	1050	9																								
79	3-12	1105	7																								
1419	3-13					24,000																					
1517	3-14	1110																									
092009	9-20	1140	24	23	22																						
2109	9-21	1205	21.5	21.5	22																						

Indian Head - Station 10

67012418	1-24	1005				500																					
3125	1-31	1100	5			700																					
030324	3-03	1230	2.5			3,480																					
34	3-03	1230	2.5																								
0611	3-04	1150	3			9,180																					
20	3-05	1130	2.5			9,180																					
40	3-04	1150	3																								
54	3-05	1130	2.5																								
69	3-06	1150	4.5			9,180																					
85	3-06	1150	4.5																								
0815	3-08	1200	4			91,800																					
31	3-08	1200	4																								
1013	3-10	1140	6.5			LA																					
29	3-10	1140	6.5																								
1311	3-11					LA																					
27	3-12					LA																					
64	3-11	1110	8																								
80	3-12	1120	6.5																								
1420	3-13					3,480																					
1518	3-14	1125	8.5																								
092010	9-20	1155	23	23	24																						
2110	9-21	1215	21.2	20.9	24																						

LA Laboratory accident

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C		Secchi Disk Bottom	Inches	Coliform MPN	Fecal Coliform MPN		Fecal Strept MPN	Total P mg/l		Inorg. P mg/l	TKN mg/l	NO ₂ +NO ₃ mg/l		Chlorophyll a mg/l	Turbidity JTU		Chlorides mg/l		DO mg/l	
			Top	Bottom				MPN	MPN		FO ₄	FO ₄			mg/l	mg/l		mg/l	mg/l	mg/l	mg/l	Top	Bottom
Possum Point - Station 11																							
67022321	2-23	1300	4				790			70 < 20													
2410	2-24	1205	2				20			< 20 < 20													
2707	2-27	1150					1,090			460 < 20													
2809	2-28	1310	4				170			< 20 < 20													
030233	3-02	1300	3				700			130 < 20													
39	3-02	1300	3																				
0328	3-03	1235	6				490			< 20 < 20													
38	3-03	1235																					
0614	3-04	1120	4.5				LA			LA < 20													
24	3-05	1230	3				1,720			170 < 20													
43	3-04	1230	4.5																				
58	3-05	1230	3																				
74	3-06	1325	3.5				490			40 20													
90	3-06	1325	3.5																				
0820	3-08	1230	5				40			< 20 < 20													
36	3-08	1230	5																				
0911	3-09	1300	5				16,090			2,400 LA													
22	3-09	1300	5																				
1018	3-10	1300	6				LA			490 LA													
34	3-10		6																				
1316	3-11	1205	7				LA			LA LA													
31	3-12	1235	6				LA			LA LA													
69	3-11	1235	7																				
84	3-12	1205	7																				
1425	3-13	1210	7				16,090			2,400 1,090													
35	3-13	1210	8																				
1523	3-14	1230	8																				
092011	9-20	1210	23	23	26																		
2111	9-21	1235	21.1	21	30																		
Sandy Point - Station 12																							
67030623	3-05	1215	4				130			20 < 20													
57	3-05	1215	4																				
73	3-06	1245	4				50			< 20 < 20													
89	3-06	1245	4																				
0819	3-08	1200	4				170			20 < 20													
35	3-08	1200	4																				
0910	3-09	1220	5				LA			LA LA													
21	3-09	1220	5																				
1017	3-10	1125	5.5				LA			1,720 LA													
33	3-10	1125	5.5																				

LA Laboratory accident

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Strept MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
			Top	Bottom												Top
																Bottom

Sandy Point - Station 12 continued

67031315	3-11				LA	9,180	LA									
30	3-12	1135	6.5		LA	LA	LA	.548								
68	3-11	1200	6					5.928								
83	3-12	1135	6.5													
11424	3-13				5,420	330	1,300	.612								
34	3-13	1145	7					.595								
1522	3-14	1200	7.5					.408								
092012	9-20	1225	23	28				.084	.922	.416	.147.75			12	613	7.75
2112	9-21	1247	21.5	24				.201	1.286	.439	1403.50				671	8.54
			21.5													7.46
																7.39

Smith Point - Station 13

67022320	2-23	1120	4		80	20	< 20									
2409	2-24	1105	3			< 20	< 20									
2706	2-27	1100	2		220	< 20	< 20									
2808	2-28	1230	4		< 20	< 20	< 20									
030232	3-02	1230	3		110	< 20	< 20									
38	3-02	1230	3					.986								
0327	3-03	1200	4.5		80	< 20	< 20									
37	3-03	1200				< 20	< 20	.960								
0613	3-04	1120	3		20	< 20	< 20									
22	3-05	1130			< 20	< 20	< 20									
42	3-04	1120						.797								
56	3-05	1130	3					.669								
72	3-06	1215	4		50	50	< 20									
88	3-06	1215	4					.752								
0818	3-08	1145	4		700	230	20									
34	3-08	1145	4					.724								
0909	3-09	1135	5		16,090	3,480	LA									
20	3-09	1135	5					.752								
1016	3-10	1100	5.5		LA	790	LA									
32	3-10	1100	5.5					.797								
1314	3-11				LA	LA	LA									
29	3-12	1100	6.2		LA	LA	LA	.696								
67	3-11	1135	6		LA	LA	LA	.708								
82	3-13	1100	6.2													
11423	3-13				2,400	490	490									
33	3-13	1120	6					.813								
1521	3-14	1135	8					.575								
092013	9-20	1235	23	32				.384	.609	.410	24.75			5	580	7.91
2113	9-21	1300	21.8	30				.410	.293	.416	97.50				700	8.54
			21.5													7.27

LA Laboratory accident

Sample Number	Date Sample Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Fecal Sreep. MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₂ -N mg/l	NO ₃ -N mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
Maryland Point - Station 14																
67022319	2-23	1045	4		20	< 20	< 20									
2408	2-24	1035	3		< 20	< 20	< 20									
2705	2-27	1025	1		20	< 20	< 20									
030231	3-02	1150	3		< 20	< 20	< 20									
37	3-02	1150	0					2.486								
0326	3-03	1125	4		330	< 20	< 20	.806								
36	3-04	1125	5.5		50	< 20	< 20									
0612	3-04	1040	4		20	< 20	< 20									
21	3-05	1045	5.5													
41	3-04	1040	4					.684								
55	3-05	1045	4					.646								
70	3-06	1140	3.5		< 20	< 20	< 20									
86	3-06	1140	3.5					7.983								
0715	3-07	1055	4		20	< 20	< 20	.706								
27	3-07	1055	0													
0817	3-08	1110	3.5		2,400	330	< 20	.753								
33	3-08	1110	3.5		16,090	490	LA									
0908	3-09	1050	5					.912								
19	3-09	1015	5		LA	1,300	LA	.802								
1015	3-10	1030	5.5		LA	LA	LA									
31	3-10	1030	5.5		LA	LA	LA									
1313	3-11	1050	6.5					.820								
28	3-12	1025	6					.627								
66	3-11	1050	6.8													
81	3-12	1025			16,090	230	700	.048								
1422	3-13		6					.060								
32	3-13	1100	7					.415								
1520	3-14	1250	23	24				.415								
092014	9-20	1310	22	30					.198	.621	.352	.395	32.25	9	1130	7.06
2114	9-21								.319	.489			65.25		1230	8.14
																6.71
Manjency Creek - Station 15																
67022318	2-23	0910	4		< 20	< 20	< 20									
2407	2-24	0930	3		< 20	< 20	< 20									
2807	2-28		4		< 20	< 20	< 20									
030230	3-02	1050	2		< 20	< 20	< 20									
36	3-02	1050	2		< 20	< 20	< 20									
0325	3-03	1020	4		< 20	< 20	< 20	.528								
35	3-03	1030	4		< 20	< 20	< 20									
0671	3-06	1020	3		< 20	< 20	< 20	.490								
87	3-06	1020	3		< 20	< 20	< 20	.304								

LA Laboratory accident

Sample Number	Date Taken	Time Sample Taken	Water Temp °C	Secchi Disk Inches	Coliform MPN	Fecal Coliform MPN	Strep. MPN	Total P mg/l	Inorg. P mg/l	TKN mg/l	NO ₃ -N mg/l	NO ₂ +NO ₃ mg/l	Chlorophyll a µg/l	Turbidity JTU	Chlorides mg/l	DO mg/l
67030714	3-07	1020	4	20	20	< 20	< 20									
26	3-07	1020	4		16,090	5,420	700	.444								
0816	3-08	1040	4					.649								
32	3-08	1040	4		230	50	LA	1.084								
0907	3-09	1010	4		LA	2,400	LA	.907								
18	3-09	1010	4		LA	LA	LA	.529								
1014	3-10		5.5													
30	3-10		5.5													
1312	3-11	1010	7		2,400	60	790	3.226								
65	3-11							3.917								
1421	3-13	0953	6					.390								
31	3-13	1000	7					.541								
1519	3-14	1305	23	32					.204	.646	.273	.276	17.25	5	2070	6.68
092015	9-20	1305	21.5	32					.336	.734	.276		133.50		2510	7.93
2115	9-21	1325	21.5	32												
67092016	9-20	1330	24	38				.198		.164	.220	.220	12.00	2	3530	6.71
2116	9-21	1345	21.5	42				.339		.395	.235	.235	19.50		4040	5.42
								.480								5.97

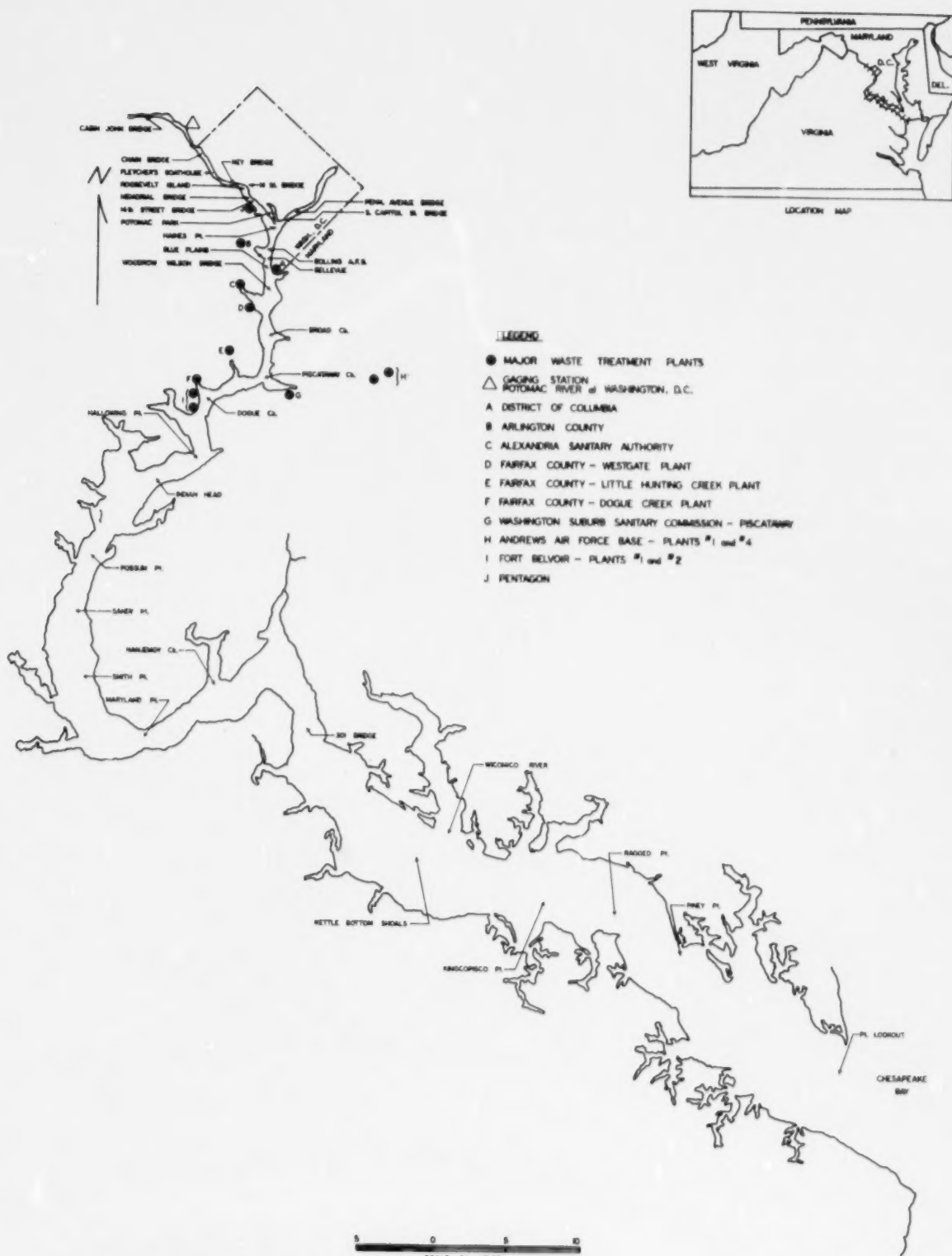
Nanjemoy Creek - Station 15 continued

301 Bridge - Station 16

BACTERIOLOGICAL DATA
SEWAGE TREATMENT PLANTS
February 1967
CHESAPEAKE TECHNICAL SUPPORT LABORATORY

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Sample Number	Date Sample Taken	Time Sample Taken	Coliform MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Streptococci MPN/100 ml
<u>Alexandria</u>					
67020302	2-02	1215	5,420,000	490,000	175,000
15	2-03	1050	1,720,000	110,000	330,000
18		1340	9,180,000	5,420,000	700,000
0616	2-06	1410	16,090,000	3,480,000	918,000
18		1525	17,200,000	2,400,000	542,000
1313	2-13	1045	10,900,000	700,000	110,000
17		1400	16,090,000	1,720,000	130,000
1410	2-14	1230	16,090,000	460,000	80,000
14		1445	10,900,000	800,000	230,000
1519	2-15	1050	16,090,000	9,180,000	230,000
22		1340	9,180,000	3,480,000	490,000
1708	2-17	1105	7,000,000	1,700,000	80,000
12		1330	5,420,000	330,000	230,000
2009	2-20	1200	3,480,000	460,000	1,090,000
2119	2-21	1125	5,420,000	50,000	130,000
23		1400	9,180,000	40,000	490,000
<u>Arlington</u>					
67020301	2-02	1140	2,400,000	790,000	918,000
14	2-13	1020	3,480,000	1,300,000	330,000
17		1310	5,420,000	1,300,000	490,000
0615	2-06	1340	24,000,000	5,420,000	278,000
17		1455	16,090,000	16,090,000	542,000
1312	2-13	1015	5,420,000	2,400,000	490,000
16		1330	2,400,000	2,400,000	140,000
1409	2-14	1200	3,480,000	700,000	1,090,000
13		1415	9,400,000	2,100,000	790,000
1518	2-15	1020	3,480,000	2,400,000	490,000
22		1310	3,480,000	3,480,000	700,000
1707	2-17	1035	2,400,000	490,000	790,000
11		1300	16,090,000	630,000	500,000
2008	2-20	1130	3,480,000	1,090,000	1,400,000
2118	2-21	1055	9,180,000	110,000	490,000
22		1330	24,000,000	210,000	700,000
<u>Blue Plains</u>					
67020304	2-02	1415	> 16,090,000	5,420,000	348,000
0614	2-06	1250	16,090,000	5,420,000	172,000
1315	2-13	1145	9,180,000	790,000	230,000
19		1500	17,200,000	700,000	220,000
1412	2-14	1325	5,420,000	700,000	140,000
16		1540	17,200,000	2,300,000	220,000
1517	2-15	0915	34,800,000	10,900,000	4,600,000
21		1225	17,200,000	4,600,000	330,000
1710	2-17	1150	54,200,000	1,100,000	330,000
14		1415	5,420,000	330,000	500,000
2011	2-20	1250	17,200,000	1,090,000	260,000
2121	2-21	1210	17,200,000	20,000	130,000
25		1450	5,420,000	40,000	330,000
<u>Fairfax Westgate</u>					
67020303	2-02	1330	542,000	49,000	110,000
16	2-03	1120	< 2,000	< 2,000	< 2,000
19		1400	< 2,000	< 2,000	< 2,000
1314	2-13	1110	< 20,000	< 20,000	< 20,000
18		1430	< 20,000	< 20,000	< 20,000
1411	2-14	1250	< 20,000	< 20,000	< 20,000
15		1510	< 20,000	< 20,000	< 20,000
1520	2-15	1115	< 500	< 200	< 200
24		1400	< 200	< 200	< 200
1709	2-17	1130	< 330	< 20	< 20
13		1350	< 170	< 50	< 20
2010	2-20	1225	< 790	< 20	< 20
2120	2-21	1145	< 50	< 20	< 40
24		1420	< 20	< 20	< 50



POTOMAC ESTUARY